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# State Marine

## Port Arthur, Texas
## CERCLIS #TXD099801102

## Site Exposure Potential

The State Marine property occupies approximately 2.8 hectares in Port Arthur, Texas, on Pleasure Islet, a peninsula on the northwest shore of Sabine Lake, a 260-km$^2$ estuarine embayment of the Gulf of Mexico (Figure 1). State Marine cleaned barges that had been used to transport petroleum and other bulk chemicals. The State of Texas issued a permit for State Marine to discharge treated wastewater from barge cleaning operations to Sabine Lake in 1974. However, the State later found that the wastewater treatment system was being used for storage, not for treatment, and also documented direct discharges of barge contents to Sabine Lake. In addition, the holds of the work-barges leaked into the lake (TNRCC 1996). Barge wash-down operations ended in 1996. The facility includes a wastewater treatment plant, three unlined surface impoundments, above-ground storage tanks, and several work barges on Sabine Lake. The surface impoundments were backfilled sometime before 1996 (Figure 2).

Sampling of site soils suggests that the buried impoundments, the former tank farm, and an area adjacent to the Lake are contaminant source areas (Figure 2). The State conducted an Expanded Site Inspection in 1996 (TNRCC 1997); the site was proposed for inclusion on EPA's National Priorities List on March 6, 1998 (63 FR 11340).

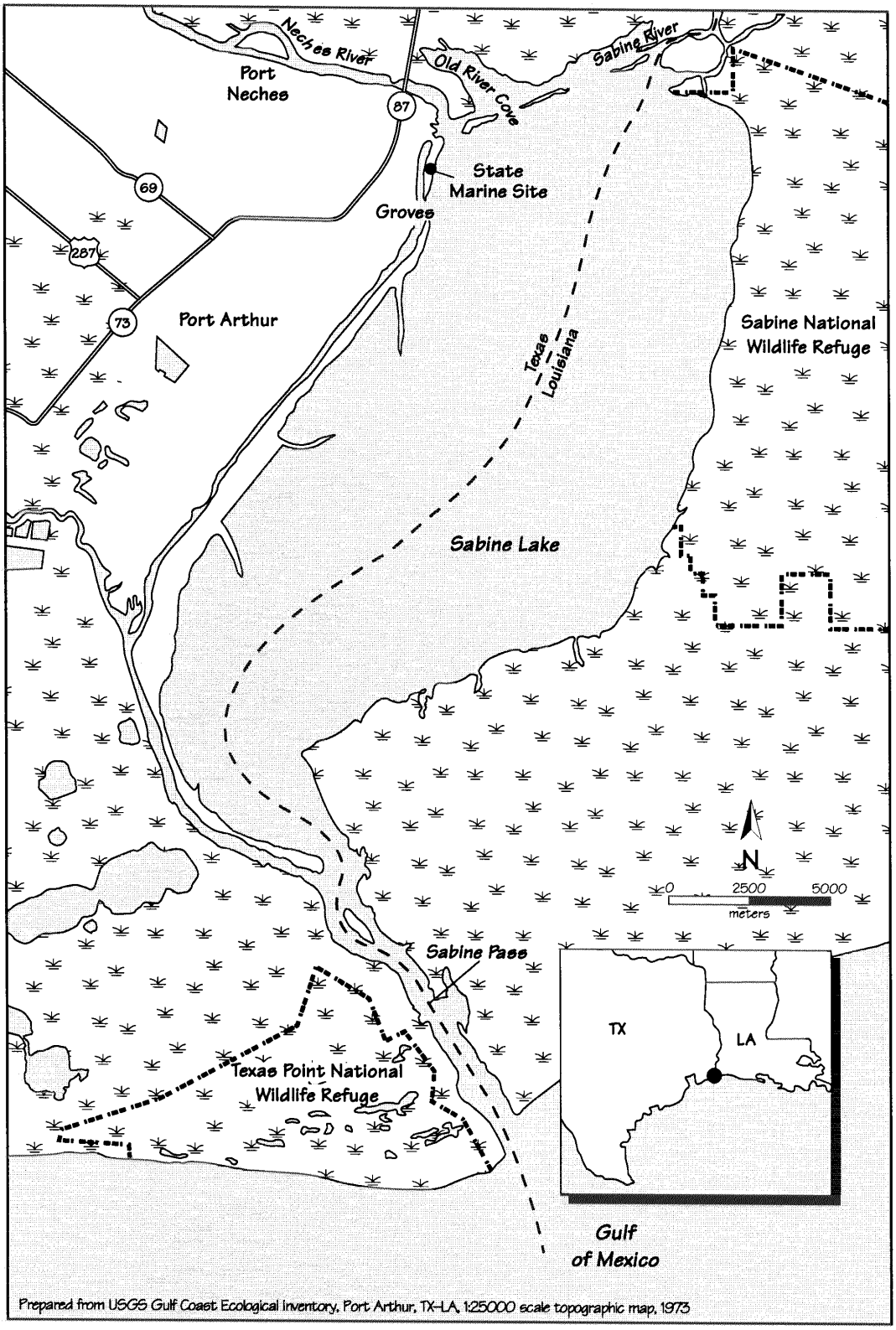


Figure 1. Sabine Lake and the State Marine study area.

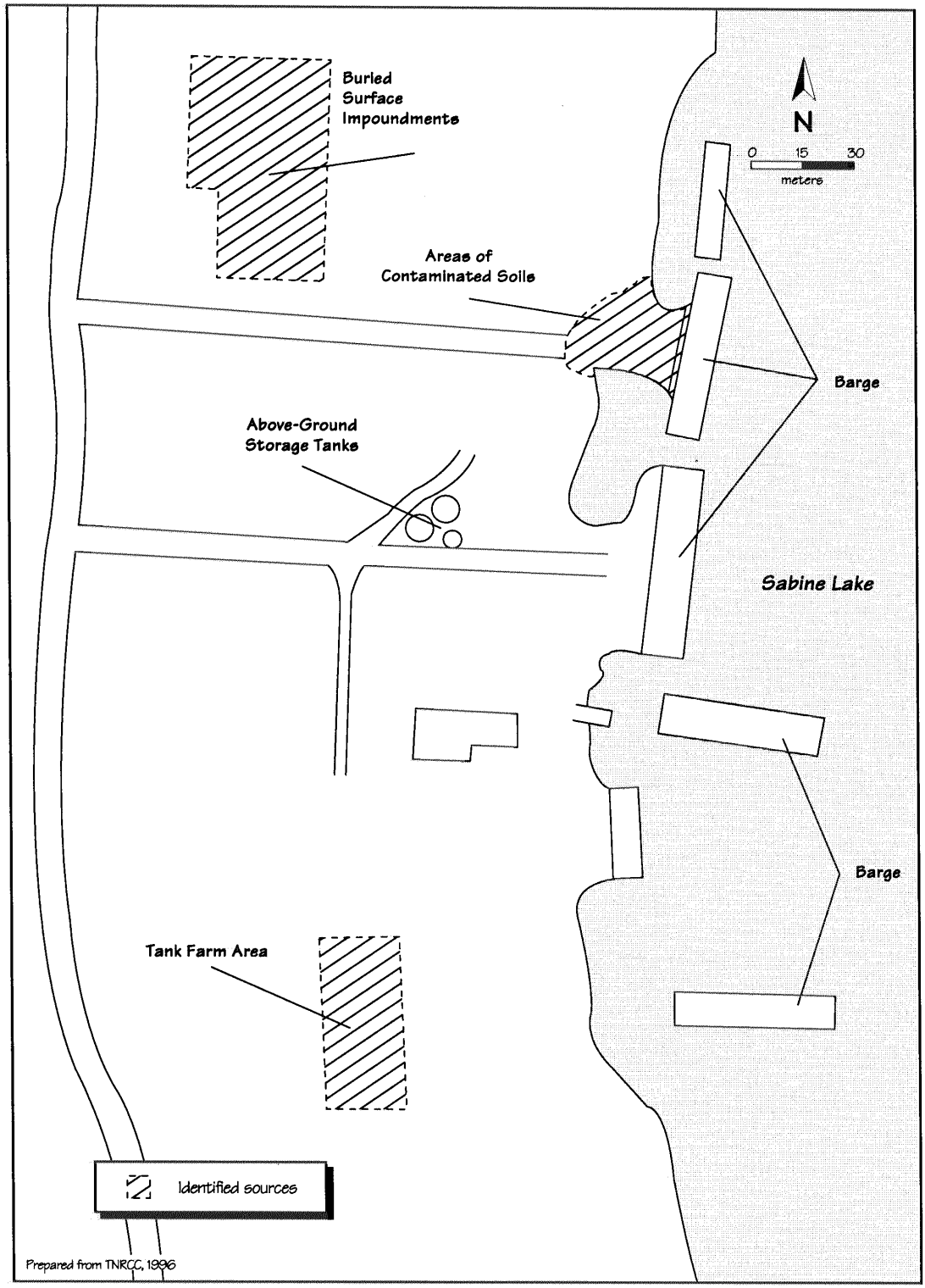


Figure 2. The State Marine site in Port Arthur, Texas.

Pathways for the transport of site-related contaminants to off-site receptors are the historic discharge of barge washwater into Sabine Lake, stormwater transport, and associated erosion. Groundwater at the site has not been sampled. No information was provided about cargo, fuel, or ballast on the barges (TNRCC 1996).

## NOAA Trust Habitats and Species

The habitats of primary concern to NOAA are estuarine surface waters, associated wetlands, and bottom substrates of Sabine Lake and the lower Neches River. Numerous NOAA trust fish and invertebrate species use the estuary for spawning, rearing, and foraging (Nelson et al. 1992; Table 1). Of the major estuaries in Texas, Sabine Lake has one of the largest freshwater inflows, resulting in a low average salinity of 2.3 ppt. Water depth in Sabine Lake averages 1.8 m deep (Armstrong 1987; USFWS 1998).

Nearly 14,000 hectares of vegetated wetlands, dominated by saltgrass (*Distichlis spicata*) and cordgrass (*Spartina* spp.), border the estuary. The largest saltmarsh is to the south and west of Sabine Lake, with smaller marshes along the Sabine and Neches rivers at the head of the estuary (Armstrong 1987).

Two National Wildlife Refuges are associated with wetland areas of Sabine Lake. The Sabine National Wildlife refuge, a 50,000-hectare estuarine and freshwater wetland on the eastern border of the lake, extends from Sabine Lake to Lake Calcasieu, Louisiana (USFWS 1998). At the southern border of the lake, the Texas Point National Wildlife Refuge, a 3,600-hectare saltmarsh, is adjacent to Sabine Pass, which connects Sabine Lake to the Gulf of Mexico (Figure 1; US Fish and Wildlife Service 1998b).

Sabine Lake provides adult foraging, juvenile nursery, migratory, and spawning habitat to numerous fish species (Table 1). The anadromous gizzard shad uses Sabine Lake as a migratory corridor to the Neches and Sabine rivers during spring spawning runs. Small estuarine fish such as bay anchovy, sheepshead minnow, gulf killifish, hardhead catfish, and silversides spend their entire lives within the estuary. Adult southern flounder, spot, Atlantic croaker, sheepshead, and striped mullet use the estuary seasonally. Many other species spawn in more saline waters, but use the estuary as a juvenile nursery (Pattillo et al. 1997).

Blue crab are abundant in Sabine Lake as both adults and juveniles. Adult males remain in the estuary after mating, while females usually return to more saline water to brood eggs. Larvae are released offshore, and are subsequently transported back into estuaries where they settle to the bottom. Grass shrimp also are common in Sabine Lake, typically spending their entire lives in the estuary, where they prefer saltmarsh and oyster reef habitats. Brown and white shrimp use Sabine Lake and surrounding wetlands as nursery

**Table 1. Principal NOAA trust species using habitats in Sabine Lake.**

| Species | | Fisheries | | | Habitat Use | |
|---|---|---|---|---|---|---|
| Common Name | Scientific Name | Spawning Ground | Nursery Area | Adult Forage | Comm. Fishery | Recr. Fishery |
| ANADROMOUS SPECIES | | | | | | |
| Gizzard shad | *Dorosoma cepedianum* | | ◆ | | | |
| MARINE/ESTUARINE SPECIES | | | | | | |
| Atlantic croaker | *Micropogonias undulatus* | | ◆ | ◆ | | ◆ |
| Bay anchovy | *Anchoa mitchilli* | ◆ | ◆ | ◆ | | |
| Black drum | *Pogonias cromis* | | ◆ | ◆ | | ◆ |
| Gafftopsail catfish | *Bagre marinus* | ◆ | ◆ | ◆ | | ◆ |
| Gulf killifish | *Fundulus grandis* | ◆ | ◆ | ◆ | | |
| Gulf menhaden | *Brevoortia patronus* | | ◆ | | | |
| Hardhead catfish | *Arius felis* | ◆ | ◆ | ◆ | | |
| Pinfish | *Lagodon rhomboides* | | ◆ | ◆ | | |
| Red drum | *Sciaenops ocellatus* | | ◆ | | | ◆ |
| Sheepshead | *Archosargus probatocephalus* | | ◆ | ◆ | | ◆ |
| Sheepshead minnow | *Cyprinodon variegatus* | ◆ | ◆ | ◆ | | |
| Silver perch | *Bairdiella chrysoura* | | ◆ | ◆ | | |
| Silversides | *Menidia spp.* | ◆ | ◆ | | | |
| Southern flounder | *Paralichthys lethostigma* | | ◆ | ◆ | | ◆ |
| Spot | *Leiostomus xanthurus* | | ◆ | ◆ | | ◆ |
| Spotted sea trout | *Cynoscion nebulosus* | | ◆ | ◆ | | ◆ |
| Striped mullet | *Mugil cephalus* | | ◆ | ◆ | | ◆ |
| INVERTEBRATE SPECIES | | | | | | |
| Blue crab | *Callinectes sapidus* | ◆ | ◆ | ◆ | ◆ | ◆ |
| Brown shrimp | *Penaeus aztecus* | | ◆ | ◆ | ◆ | ◆ |
| Eastern oyster | *Crassostrea virginica* | ◆ | ◆ | ◆ | | ◆ |
| Grass shrimp | *Palaemonetes pugio* | ◆ | ◆ | ◆ | | |
| Rangia | *Rangia cuneata* | ◆ | ◆ | ◆ | | ◆ |
| White shrimp | *Penaeus setiferus* | | ◆ | ◆ | ◆ | ◆ |

areas and then move offshore as juveniles. The most abundant bivalve species is the common rangia, followed by the eastern oyster. All oyster and rangia life stages are present within the estuary (Nelson et al. 1992; Pattillo et al. 1997).

Sabine Lake contains both recreational and commercial fisheries. Recreational catch includes blue crab, spotted sea trout, southern flounder, Atlantic croaker, gafftopsail catfish, and red and black drum. The freshwater inflow from the Neches River attracts many species, making the shoreline next to State Marine a popular area to fish, both from the bank and from boats. Sabine Lake supports commercial fisheries for blue crab, and both brown and white shrimp. No health

advisories or restrictions on fishing or consumption have been issued (TNRCC 1997).

## Site-Related Contamination

The limited available data indicate that soils on the facility and Sabine Lake sediments contain elevated concentrations of several PAH compounds and trace elements. Organic compounds and trace elements are contaminants of concern at the site. Table 2 summarizes the maximum measured contaminant concentrations, along with offsite (background) concentrations and appropriate screening guidelines.

Most individual PAH concentrations ranged from <1 to 8 mg/kg (ppm); however, a soil sample at the former tank farm contained 25 mg/kg pyrene. Highly elevated concentrations of copper, lead, and zinc also were observed in soils, particularly in the source area near the Lake. Maximum concentrations of these three elements exceeded 1,000 mg/kg in this area (TNRCC 1997).

**Table 2. Maximum concentrations of contaminants of concern at State Marine.**

| | Soil (mg/kg) | | Sediment (mg/kg) | | |
|---|---|---|---|---|---|
| | Soils | Mean U.S. [a] | Sediment | ERL [b] | Offsite Sediment [c] |
| Trace Elements | | | | | |
| Copper | 1670 | 17 | NR | 34 | NR |
| Lead | 4090 | 16 | 362 | 46.7 | NR |
| Mercury | 0.3 | 0.058 | NR | 0.15 | NR |
| Nickel | 243 | 13 | NR | 20.9 | NR |
| Zinc | 38700 | 48 | 3910 | 150 | NR |
| Organic Compounds | | | | | |
| Anthracene | 3.4 | NA | 2 | 0.085 | ND |
| Phenanthrene | 4.8 | NA | 7.1 | 0.24 | 0.040 |
| Benzo(b)fluoranthene | 4.6 | NA | 3.6 | NA | 0.036-0.064 |
| Benzo(a)pyrene | 3.9 | NA | 2.3 | 0.43 | 0.045 |
| Pyrene | 25 | NA | 8.8 | 0.67 | 0.024-0.18 |
| Chrysene | 8.4 | NA | 3.9 | 0.38 | 0.053-0.11 |
| Fluoranthene | 7.9 | NA | 9.1 | 0.60 | 0.094 |
| Fluorene | 1.2 | NA | 0.79 | 00.019 | ND |
| Benz(a)anthracene | 3.8 | NA | 0.86 | 0.26 | ND |

a: Mean U.S. soil trace element concentrations (Shacklette and Boerngen 1984).
b: Effects range-low; the concentration representing the 10th percentile for the dataset in which effects were observed or predicted in studies compiled by Long et al (1995).
c: The range of detectable concentrations observed in 8 sediment samples collected offsite, within the watershed (TNRCC 1996).
ND: Not detected; detection limit not available.
NA: Screening guidelines not available.
NR: Data were not reported.

Sediment samples collected in the Lake next to the facility had PAH concentrations that exceeded applicable ecological screening guidelines. Eight of the measured PAH compounds exceeded their respective ERLs by more than an order of magnitude. Concentrations of these compounds in sediment areas upgradient of the facility ranged from not detected for fluorene and anthracene to 0.18 mg/kg for pyrene (TNRCC 1997; Table 2).

Concentrations of lead and zinc in sediment also exceeded ecological screening guidelines by an order of magnitude. Sediment concentrations of other trace elements were not reported, even though they were significantly elevated in site soils.

## Summary

State Marine operated a cleaning facility to remove residuals from tank barges that had been used to transport petroleum and bulk chemicals. The facility is located on the shore of Sabine Lake, a shallow, estuarine embayment of the Gulf of Mexico. The state has documented the direct discharge of barge wash water into Sabine Lake. Site soils and the sediments of Sabine Lake are contaminated with PAHs and trace elements. Groundwater and several on-site barges have not yet been investigated. Sabine Lake is a productive Gulf estuary with a variety of invertebrate and finfish species that support both commercial and recreational fisheries.

## References

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